Draft Conservation Assessment for

Common tern (Sterna hirundo)

USDA FOREST SERVICE, EASTERN REGION
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This document is undergoing peer review, comments welcome

This Conservation Assessment was prepared to compile the published and unpublished information on the subject taxon or community; or this document was prepared by another organization and provides information to serve as a Conservation Assessment for the Eastern Region of the Forest Service. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject taxon, please contact the Eastern Region of the Forest Service - Threatened and Endangered Species Program at 310 Wisconsin Avenue, Suite 580 Milwaukee, Wisconsin 53203.

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EXECUTIVE SUMMARY

This is a draft Conservation Assessment providing a summary of readily available information on the distribution, ecology, habitat, and population biology of common tern (*Sterna hirundo*) in the Great Lake States. This document was compiled to assist in writing of the Conservation Assessment for the Beach Dune Community.

In the early 1900s, common terns were almost extirpated by plume hunters (Evers 1997, NYSDEC 1998). Protective legislation under the Migratory Bird Treaty of 1916 allowed this species to make a comeback in the 1920s and 1930s (NYSDEC 1998, Hyde 1997).

Declining populations were again seen in the mid-1980s in Michigan, the cause was attributed to declining quality of their nesting habitat (Hyde 1997). There has been a steady decline of common terns in local areas. On Leech Lake, from 1,000 pairs to 250 pairs down to 60 pairs, there is a decline of 2-4% of the total population every year (Mortensen, pers. comm. 2001). Niemi et al. 1998 In Russ 1999 estimates an 8 percent decline per year in the Lake States based on data from the eastern U.S. The common tern has been listed as a "rare and declining" species in the Lake States by the US Fish and Wildlife Service in their Region 3 Fish and Wildlife Resource Conservation Priorities January 1999 (Russ, 1999).

A combination of natural and human-related factors is impacting the common tern populations. Regularly fluctuating water levels of the Great Lakes, erosion, and succession of vegetation reduce or eliminate suitable nesting sites (Hyde 1997, Evers 1997). Competition (especially from ring-billed gulls *Larus delawarensis* and herring gulls *Larus argentatus*) for nest sites and predation are significant limiting factors (Hyde, 1997). In Minnesota the decline is mainly predator caused and the older birds that are successful breeders are beginning to die off (Mortensen, pers. comm. 2001). In the state of New York, many colonies are being forced to breed in salt water marsh habitats as a result of the increased human use of beaches and competition with herring and great black-backed gulls (NYSDEC 1998).

In the Great Lakes Region, the major threat to common tern of nest-site competition is from expanding and increasing ring-billed gull populations (NatureServe 2001, van Frankenhuyzen In McPeek & Adams 1994, Maxson et al 1996). Other threats in the Great Lakes Region include flooding and rising water levels (NatureServe 2001), predation by other bird or animals, and possibly biocide contamination (Buckley and Buckley 1984 In NatureServe 2001). The common tern is susceptible (especially females just prior to egg laying) to poisoning from dinoflagellate toxin accumulated in fishes (Nisbet 1983 In NatureServe 2001). There are some threats due to contaminants (Spendelow, pers. comm. 2001). Erosion of sand from rock beaches or rocky islands also is a threat to loss of nesting habitat for the common tern (Mortensen, pers. comm. 2001, Evers 1997). Soil deposition is connecting nest islands to shores in some areas allowing predators to access nest areas (Russ 1999). Fishing territories are subject to increasing human development and activities. A suspected reduction in water quality may be affecting fish production (Russ 1999). Nesting terns have reduced nesting success from prolonged inclement weather and human displacement (WIDNR 2000). Currently dependent on nesting habitat in the Great Lakes, the common tern is regularly affected by fluctuating water levels, which sometimes vary several feet (Evers 1997). Vegetation succession reduces the number of potential nesting sites (Evers 1997).

The common tern needs to be studied on a regional scale and immigration/emigration of colonies needs to be addressed as being part of the population dynamics of this species (Spendelow, pers. comm. 2001).

ACKNOWLEDGEMENTS

Information was provided by the following individuals: Dr. Jeff Spendelow, USGS Research Biologist; Steve Mortensen, Wildlife Biologist, Leech Lake Band Ojibwe; Wayne Russ, Wildlife Biologist, Chippewa National Forest; Sharron Nelson, Minnesota Heritage and Nongame Program; Anthony Zammit, Ontario Natural Heritage Information Centre; Robert Gottfried, Illinois Natural Heritage Database; Teresa Mackey, Information Services, New York Natural Heritage Program; Michael Fashoway, Michigan Natural Features Inventory Program; Kierstin Carlson, Pennsylvania Natural Diversity Inventory; Mark Schieldcastle, Research Wildlife Biologist, Ohio Department of Natural Resources, Crane Creek Wildlife Area; Steve Sjogren, Wildlife Biologist, Hiawatha National Forest; Andi Hales, Biological Science Technician, Hiawatha National Forest. Julie Williams compiled the State Endangered, Threatened, and Sensitive Species lists for the majority of the states within the continental U.S. and Canadian provinces. Mike Tripp conducted a literature review of current research on common terns. Editorial assistance provided by Beth Funderburg, USFS, St. Ignace MI.

NOMENCLATURE AND TAXONOMY

Scientific name:	*Sterna hirundo* (Linnaeus, 1758)
Subspecies:	none
Common name:	Common tern
Order:	Ciconiiformes
Family:	Laridae
Synonym (s):	no synonyms for common name

DESCRIPTION OF SPECIES

The common tern is a medium-sized tern (length 14 inches, wingspan 31 inches) with a smoothly rounded head without a crest, slender, pointed bill, and a long, deeply forked tail. The common tern has a black eye patch that continues across the nape. Underwings are pale with broad, blurry, dark trailing edge. The upperwing is gray with dark outer primaries (this is variable according to state of condition of plumage). A window of translucent primaries shows through wings on inner primaries and outer secondaries when in flight. The sexes are similar in coloration (Gough et. al. 1998). It can take three years for juveniles to reach full adult plumage.

In **adult basic plumage** the common tern has red legs and a black bill. The belly, breast, foreneck, face, and forehead are white. A black cap extends up from the eye to the crown and rearward from the eye to the back of the head. The outer primaries darken with wear becoming dark gray. Adult basic plumage exhibits a dark carpal bar (Gough et. al. 1998). The **adult alternate form** has red legs, an orange-red bill with a black tip, black cap, and a white face**.** The foreneck, breast, and belly are a medium gray color. The outer primaries show a “dark wedge” and the pattern darkens with wear through the season so that the outer five primaries are entirely dark in color by late summer. The tail extends only to the tip of the primaries while at rest. This form has a white rump and tail with dark edges to the outer retricies (Gough et al. 1998).

Juveniles have pale flesh-colored legs, a pink to yellow-based bill that turns black with age and dark carpal bar. The belly, breast, foreneck, and forehead are white. The color of the back is variable-often gray with

pale brown and black feather edges. Wings are gray with brown tips to the upperwing coverts. The secondaries are dark and the lesser coverts contrast with the paler inner wing. The tail is short with dark tips.

Immatures: The first-year birds have the plumage of the adult basic. Second year birds have plumage like the adult alternate but often with white feathers in the cap, paler breasts, and faint carpal bars (Gough et. al. 1998). The common tern dives into the water for prey. The common tern is most similar to the Roseate, Arctic, and Forster's terns. The Arctic tern is quite similar in all plumages but has a shorter, stubbier bill, shorter legs, and a longer tail. By late summer, common terns begin molting flight feathers before migrating to their wintering grounds while the Arctic terns do not molt until reaching the wintering grounds (Gough et. al. 1998). The Roseate tern can be told from the common tern by its longer all white tail, darker bill (except in late summer), paler underparts and upperparts, and lack of a dark trailing edge to the undersurface of the primaries. The Forster's tern has a distinctive black eye patch except in the breeding season it does not extend across the nape (Gough et. al. 1998). This species very rarely hybridizes with Roseate tern (Zingo et al 1994 In NatureServe 2001). The call is a harsh, rolling "kee-urr" or drawled "kee-arr"(Hyde 1997), with a downward inflection (NYSDEC 1998).

LIFE HISTORY

The common tern is a colonial breeder (NatureServe 2001), breeding in wetland-open water habitats (G. Gough 2000). The common tern cooperates to defend the colony against competitors and predators (Hyde 1997, Evers 1997). They have one brood per year, occasionally two broods (Hay 1984 In Evers 1997). The nests are either a small, excavated hollow in the sand and gravel, or a nest constructed of a slightly raised mound with a lining of fine grass and other vegetation (Hyde 1997). Blokpoel et al 1987 In Hyde 1997 found nests in the Lower Great Lakes are usually associated with low, herbaceous vegetation and driftwood. Eggs are typically laid in May-July (NatureServe 2001). Clutch size varies from 2-3 (NatureServe 2001) to 2-4 (Gough, G. 2000). Incubation is between 21-27 days (Gough, G. 2000 and NatureServe 2001), 22-25 days (Evers 1997). Initial nest loss is frequent but is usually compensated by second nestings (Ever 1997). Both sexes tend to the young (NatureServe 2001) and the young fledge in 26-27 days (Gough, G. 2000). Young may leave the nest after three days but return for brooding and are capable of flight approximately four weeks after hatching (Evers 1997). The number that fledge/nest/year varies tremendously from a large range of causes-predation, storms, etc. (Spendelow, pers. comm. 2001). The diet consists almost exclusively of small fish with lesser quantities of aquatic invertebrates (insects and crustaceans) (Gough, 2000 and NatureServe 2001). A small percent of common terns reproduce in their second year, most do not breed until age three (Spendelow, pers. comm. 2001). Reproductive maturity is listed as three years of age (Hyde 1997, Evers 1997).

The common tern is an opportunistic feeder (Hyde 1997) catching prey in a fashion similar to other terns by striking the water in shallow dives or skimming the surface (NYSDEC 1998). They feed on small fish (between 1 and 3 inches long) and whatever species that is most available (Courtney and Blokpeol 1980 In Hyde 1997). Common tern feed on fish, and occasionally on crustaceans (shrimp) and insects obtained at the surface of the water (NYSDEC 1998, NatureServe 2001). In some locations, insects play a significant role in the diet of the common tern (Vermeer 1973 In Hyde 1997). The pair may defend feeding territory away from the nest, especially prior to incubation (Ehrich et al 1992 In NatureServe 2001).

HABITAT

Colonies occur on sparsely vegetated sand and gravel beaches of islands and peninsulas (Hyde 1997), typically those that are isolated, also along lakes and rivers (NatureServe 2001). Common tern breed successfully on man-made islands (Schieldcastle, pers. comm. 2001) and utilize sites formed from dredged material in a few Michigan counties (Hyde 1997). They have nested on navigational aids (Karwowski et al 1995 In NatureServe 2001), power cribs, and piers (NYSDEC 1998). Ocean shoreline habitats (seacoasts, estuaries, bays, and marshes (NatureServe 2001) are used for foraging and roosting during the winter (Hyde 1997).

Detailed nesting information can be found in Spendelow, J.A. and S.R. Patton 1988. National Atlas of Coastal Waterbird Colonies in the Contiguous United States 1976-1982. U.S. Fish and Wildlife Service, Biological Report 88 (5). x + 326 pp. (NatureServe 2000).

DISTRIBUTION AND ABUNDANCE (RANGEWIDE/REGIONWIDE)

The common tern breeds in a broad belt across the Northern Hemisphere (van Frankenhuyzen 1994 In McPeek & Adams 1994); breeding in northern Alberta across central Ontario and southern Quebec to southern Labrador, south to eastern Washington, southeastern Alberta, northeastern Montana, North Dakota, northeastern South Dakota, central Minnesota, northeastern Illinois, northwestern Indiana, southern Michigan, northern Ohio and northwestern Pennsylvania, central and northern New York, and northwestern Vermont. Locally, breeding along Carolina coasts, on the Gulf Coast and Bermuda, Greater Antilles, and Netherland Antilles (NatureServe 2001). Nonbreeders occur in summer at James Bay, throughout the Great Lakes Region, along the Atlantic-Gulf coast, south in Middle America to Costa Rica and throughout the West Indies (NatureServe 2001). The American Ornithologist Union check-list of birds 1983 In NatureServe 2001 listed nonbreeding distribution as Baja California and South Carolina to Peru and northern Argentina; rare in Hawaii. The common tern winters in Central America and northern South America (Mortensen, pers. comm. 2001). Migration in Costa Rica occurs late September to mid-November and April-May (Stiles and Skutch 1989 In NatureServe 2001). In Michigan the common tern is a common migrant along Michigan's Great Lakes shorelines while it is uncommon inland (van Frankenhuyzen 1994 In McPeek & Adams 1994).

Figure 1. North American Breeding Bird Survey Summer Distribution of Common Tern

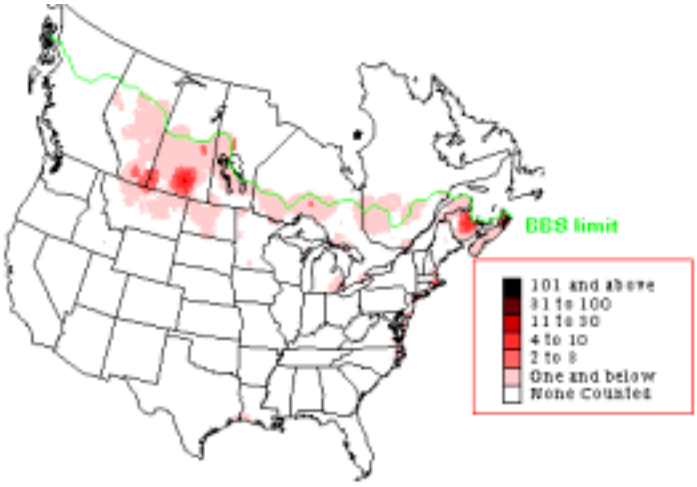

Figure 2. North American Breeding Bird Survey. Winter Distribution of Common Tern

Common tern populations peaked in the Great Lakes Region in the 1960s with approximately 32,000 individuals. The common tern suffered a decline in the 1970s (Courtney and Blokpoel 1983 In Evers 1997) and since then has stabilized although at reduced numbers of colonies and individuals (Shugart and Scharf 1983, Scharf and Shugart 1985 In Evers 1997). In 1980, Canadian Great Lakes colonies contained three times as many individuals as U.S. Great Lakes Colonies (Kress et al 1983 In Evers 1997). The U.S. Great Lakes region currently contains approximately 7% (5,000 individuals at 37 colonies) of the U.S. population which is estimated at 72, 000 individuals in nearly 300 colonies (Spendelow and Patton 1988 In Evers 1997). Concentrations within the Great Lakes contain more than 50% of the region's population (Evers 1997).

STATUS IN THE GREAT LAKES REGION

Table 1. State Rankings for Common Tern

State	State Threatened/ Endangered or Special Concern Listing	State/Province Heritage Status Ranks
Illinois	Endangered	S1
Indiana	Not listed T, E, or Special Concern	SXB, SZN
Michigan	Threatened	S2
Minnesota	Threatened	S2
New York	Not listed T, E, or Special Concern	S3B
Ohio	Endangered	S1, Ohio's State status list has recently been updated (3/01).
Ontario	NAR (Not at risk)	S4B, SZN
Pennsylvania	Not listed T, E, or Special Concern	S1B
Wisconsin	Endangered	S1B, S2N

SC = Special Concern
State Ranks: S1= Critically imperiled in the state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation in the state. S1B= the same definition as S1 but during the breeding season. S2= Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state. S3= Rare or uncommon in state (on the order of 21 to 100 occurrences). S3B= the same definition as S3 during the breeding season. S4B= Apparently secure in the state with many occurrences, during the breeding season. SXB=apparently extirpated from the state during the breeding season, SZN=non-breeding migrant/vagrant.

The global rank is G5 (November 27, 1996). G5 = secure, demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

Other states in the continental U.S. where this species is listed: Vermont (E), Connecticut (SC), Massachusetts (SC), Montana (SC), and Delaware (extremely rare). State status information was not located for Alaska, Florida, Georgia, Idaho, Kansas, Kentucky, Maine, Maryland, New Hampshire, New Jersey, North Carolina, Rhode Island, Tennessee, Texas, and West Virginia.

The North American Breeding Bird Survey results show a significant decline in common tern numbers between 1966 and 1998 in the Eastern Breeding Bird Survey, United States and Survey-wide regions (Sauer, et al. 2000). This data is assigned the middle category of credibility as defined by the North American Breeding Bird Survey. This category could reflect low relative abundances on survey routes, small sample sizes, imprecise trends and inconsistency in trend over time (Sauer, et al. 2000). The Breeding Bird data agrees with the U.S. Fish and Wildlife Service assessment of common tern as a "rare and declining" species in the Lake States by the US Fish and Wildlife Service in their Region 3 Fish and Wildlife Resource Conservation Priorities January 1999 (Russ, 1999).

POPULATION BIOLOGY AND VIABILITY

In a two-year study by Safina et al. 1988 In NatureServe 2001, fish abundance affected reproductive performance. Safina and Burger 1988 In NatureServe 2001 found in New York the breeding season was timed to overlap seasonal increases in food abundance, but food availability began to decline before peak demand for chicks. In Massachusetts, loss of eggs and chicks was attributed to nocturnal desertion by adults in response to predation by the great horned owl (Nisbet and Welton In NatureServe 2001). The presence of mink can reduce reproductive success (Condor 95:708-711 In NatureServe 2001). Small colonies are in fragmented situations and often have uneven sex ratios. Dr. Spendelow has found up to 60% females in populations (Spendelow, pers. comm. 2001). In a very broad statement Dr. Spendelow estimated that successful production of 1 chick/nest/year could maintain the population but this estimate is made with only five years of data. If the pair is successful they will stay together for life (Spendelow, pers. comm. 2001). Bill Penny conducted a PhD study on population viability of the common tern. He found successful production of 1 chick/pair/year could maintain the population (Mortensen, pers. comm. 2001).

There does not appear to be very much genetic interchange between the Great Lakes common tern population and the east coast population, Great Lakes terns appear to be faithful to their colony (Mortensen, pers. comm. 2001), only 5-6 individuals have been found from other colonies from band data. Band data also showed that individuals could live as long as fifteen years (Mortensen, pers. comm. Mortensen 2001). One banded individual was found to be 25 years old upon recapture (NYSDEC 1998).

There has been a steady decline of common terns (Leech Lake, Minnesota) from 1,000 pairs to 250 pairs down to 60 pairs. This is a decline of 2-4% of the total population every year (Mortensen, pers. comm. 2001). The cause is mainly predators and the older birds that are successful breeders are beginning to die off (Mortensen, pers. comm. 2001). Niemi et al 1998 In Russ 1999 assigned a bird conservation priority score to the common tern in the Great Lakes Basin at a 43 (on a risk index ranging from 69 to 16), in the high risk category. Colonies of up to 2,000 pairs have been documented in Michigan however the number of nests per colony site is prone to extreme fluctuation, such as routine changes in lake levels which affect the availability and size of low-elevation reef and shoal sites (van Frankenhuyzen 1994 In McPeek & Adams 1994).

POTENTIAL THREATS AND MONITORING

Present or Threatened Risks to Habitat or Range

In the Great Lakes Region, the major threat to common tern is nest-site competition from expanding ring-billed gull populations (NatureServe 2001, van Frankenhuyzen In McPeek & Adams 1994). Increasing populations of ring-billed gulls (*Larus delawarensis*) in the Great Lakes region and early arrival of gulls at breeding sites results in gradual usurpation of common tern colony sites where the two species are sympatric (Maxson et.al 1996). Other threats in the Great Lakes Region include flooding and rising water levels (NatureServe 2001); predation by other birds or animals, and possibly biocide contamination (Buckley and Buckley 1984 In NatureServe 2001). Common tern are susceptible (especially females just prior to egg laying) to poisoning from dinoflagellate toxin accumulated in fishes (Nisbet 1983 In NatureServe 2001). There are some threats due to contaminants (Spendelow, 2001). In Minnesota Lake of the Woods, fox are preying on common tern, in Duluth, Minnesota. there is competition with gulls and Canada geese (S. Mortensen, pers. comm. 2001), and fox snake have caused low nesting success along

Lake Erie (M. Schieldcastle, pers. comm. 2001). Erosion of sand from rock beaches or rocky islands also is a threat to loss of nesting habitat for the common tern (Mortensen, pers. comm. 2001, Evers 1997). Soil deposition is connecting nest islands to shores so predators can access nest areas (Russ, 1999). Fishing territories are subject to increasing human development and activities. A suspected reduction in water quality may be affecting fish production (Russ, 1999). Nesting terns have reduced nesting success from prolonged inclement weather and human displacement (WIDNR 2000). Currently dependent on nesting habitat in the Great Lakes, the common tern is regularly affected by fluctuating water levels, which sometimes vary several feet (Evers, 1997). Vegetation succession reduces the number of potential nesting sites (Evers, 1997).

Table 2. Threats or Risks to Common tern and Its Habitat by Forest

FOREST	THREAT/RISK
Chequamegon-Nicolet	Not on RF Sensitive Species list for Cheq.-Nicolet
Chippewa	Threats are competition and predation. Predation is increasing by gulls and other species. Nesting and feeding habitat is generally not on USFS (Russ, 1999).
Hiawatha	Habitat is maintained on the HNF due to shoreline of Lake MI and Lake Huron. Outside development in other areas pose threats. Protecting habitat in Pt. Aux Chenes cRNA would benefit this species (Sjogren & Prout 2000).
Huron-Manistee	Not on RF Sensitive Species list for the HMNF
Ottawa	Not on RF Sensitive Species list for the ONF
Superior	Not on RF Sensitive Species list for SNF

Commercial, Recreational, Scientific, or Educational Over-utilization

None known**.**

Disease or Predation

Predators of common tern include great-horned owls, black-crowned night heron, mink, raccoons, Norway rats, red fox, herring gulls, garter snakes, Canada geese (NatureServe 2001, WIDNR Fact Sheet 2001, Cuthbert 1980 and Evers 1994 In Hyde 1997), and fox snake (Schieldcastle, pers. comm. 2001). Mink may also prey on common tern (Condor 95:708-711 In NatureServe 2001).

Inadequacy of Existing Regulatory Mechanisms

None known.

Other Natural or Human Factors Affecting Continued Existence of Species

Human factors that limit common tern populations include development of islands and beaches, use of off-road vehicles on beaches, and release of chemical contaminants (PCBs have placed severe stress on Great Lakes populations) (Hyde, 1997).

SUMMARY OF LAND OWNERSHIP AND EXISTING HABITAT PROTECTION

Table 3. Number of Occurrences and Land Ownership by National Forest

Forest	Number of Occurrences	County	Land Ownership	Comments
Cheqamegon-Nicolet	Not a RFSS on this Forest.			Refer to the county occurrence listing in Table 4.
Chippewa			Nesting and feeding habitat is generally not on FS land. Nesting within the National Forest boundary is at Leech Lake (Objibwe Reservation)	Population is obviously declining. To attempt to maintain the species required habitat must be maintained and improved.
Hiawatha	2 occurrences.	Mackinac County	100% FS ownership	The Forest will conduct intensive surveys in 2001 for tern species.
Huron-Manistee	Not a RFSS on this Forest.			Refer to the county occurrence listing in Table 4.
Ottawa	Not a RFSS on this Forest.			Refer to the county occurrence listing in Table 4.
Superior	Not a RFSS on this Forest.			Refer to the county occurrence listing in Table 4.

Table 4. Common Tern Occurrence in the Great Lake States by County, State, and Year*

State	County of Occurrence	Number of Occurrences and Year
Illinois	Lake County	1 occurrence, 1998
Indiana	Wabash County	Have not received information requested 1/01.
Michigan	Alpena County	7 occurrences, 1961, 1962, 1977-1980, 1976-1985 (2), 1977-1985,1976-1989.
	Arenac County (ABB record)	ABB possible.
	Bay County	2 occurrences, 1985, 1977-1994.
	Charlevoix County	6 occurrences, 1960-1985, 1962-1985, 1977-1985, 1985 (2), 1999.
	Cheboygan County	1 occurrence, 1999.
	Chippewa County	30 occurrences, 1960-1961 (2), 1960-1980, 1961-1982, 1961-1985, 1962, 197?-1985, 1976-1977, 1976-1980, 1976-1981 (2), 1976-1985, 1977-1985, 1979 (2), 1979-1980 (2), 1979-1982, 1980, 1980-1982 (4), 1980-1985 (2), 1981-1982, 1985 (4).
		5 occurrences, 1976-1985 (3), 1979 -1996, 1996.
		5 occurrences, 1962, 1962-1985, 1976-1985 (2),
	Delta County	1980-1985.
		ABB possible.
	Emmet County	ABB probable.
		8 occurrences, 1962-1982, 1976-1977, 1976-1985,
	Huron County (ABB record)	1977-1985 (3), 1996, 1999.
	Luce County (ABB record)	1 occurrence, 1962.
	Mackinac County	ABB confirmed.
		2 occurrences, 1980-1985, 1985.
	Macomb County	ABB confirmed.
	Midland County (ABB record)	
	Monroe County	2 occurrences, 1980-1985 (2).
	Presque Isle County (ABB record)	1 occurrence, 1980-1985.
	St. Clair County	4 occurrences, 1960-1962, 1977-1985, 1980-1985,
	Tuscola County	1985.
	Wayne County	
Minnesota	Becker County	1 occurrence, 1985 (inactive **).
	Cass County	4 occurrences, 1971 (inactive), 1984 (inactive), 1993 (active), 1993 (inactive).
	Lake of the Wood County	8 occurrences, 1932 (inactive), 1981 (inactive), 1981 (2 both active), 1983 (2 both active), 1990 (active), 1996 (active).
	Mille Lacs County	2 occurrences, 1985 (2 both active).
	St. Louis County	11 occurrences, 1957 (inactive), 1983 (6, 2 active, 4 inactive), 1984 (inactive), 1985 (active), 1987 (inactive), 1992 (inactive).
		1 occurrence, 1984 (inactive).
	Wisconsin County	

State	County of Occurrence	Number of Occurrences and Year
New York	Erie County	3 occurrences, 1987, 1995 (2).
	Erie, Niagara County	1 occurrence, 1995.
	Jefferson County	4 occurrences, 1936, 1950, 1997, 1 record no date.
		1 occurrence, 1995.
	Madison County	18 occurrences, 1986, 1993 (2), 1994 (2), 1995,
	Nassau County	1996 (2), 1997 (4), 1998 (2), 1999(4).
		3 occurrences, 1993, 1998, 1999.
	Nassau County/NY State Waters	1 occurrence, 1987.
	Niagara County	1 occurrence, 1998.
	NY State Waters (no county name)	
	Oswego County	3 occurrences, 1957, 1995, 1997.
	Queens County	5 occurrences, 1986 (3), 1996, 1998.
	St. Lawrence County	4 occurrences, 1979, 1980-81, 1996, 1997.
	Suffolk County	46 occurrences, 1977, 1984 (2), 1985 (2), 1986 (3), 1988, 1990 (2), 1991 (1), 1992 (4), 1993 (2), 1994, 1995 (5), 1996 (5), 1997 (6), 1998 (10), 1999.
	Suffolk County/NY State Waters	4 occurrences, 1998, 1993, 1999 (2).
Ohio	Erie County	1 occurrence, 2000.
	Ottawa County	1 occurrence, 2000.
Ontario	The Ontario Natural Heritage Information Centre does not track the common tern.	
Pennsylvania	Erie County	1 occurrence, first observed 1926, last observed 1967.
Wisconsin	Ashland County	As of 6/26/01 info requested not received.
	Bayfield County	
	Brown County	
	Burnett County	Probable occurrence WBBA.
	Columbia County	
		2 confirmed occurrences WBBA.
	Door County (WBBA)	
	Douglas County	Confirmed occurrence WBBA.
	Juneau County (WBBA)	
	Lake Fond du Lac County	Confirmed occurrence WBBA.
	Manitowoc County (WBBA)	
	Marinette County	
	Oconto County	Confirmed occurrence WBBA.
	Winnebago County (WBBA)	

*County occurrence information from the following on-line searches of Michigan Natural Features Inventory, Michigan County Element List-September 1999; Wisconsin Natural Heritage Program, Rare Species and Natural Communities, NHI Working List by County; Wisconsin Breeding Bird Atlas; Indiana

Natural Heritage Data Center, List of Endangered, Threatened, and Rare Species by County, November 16, 1999; Ontario Natural Heritage Information Centre, Rare Species Query by County (query ran 1/9/01), and information supplied from database queries received from the Minnesota Heritage and Nongame Research Program, Ontario Natural Heritage Information Centre, Illinois Heritage Database, New York Natural Heritage Program and Michigan Natural Features Inventory Inventory, Pennsylvania Natural Diversity Inventory (western Pennsylvania only).

**Minnesota active/inactive colony in 2000.

Information on county occurrence from sources other than State Heritage Databases, have their sources in parenthesis. ABB=Atlas of Breeding Birds in Michigan. WBBA=Wisconsin Breeding Bird Atlas.

SUMMARY OF EXISTING MANAGEMENT ACTIVITIES

Management activities for common tern include gull deterrents, artificial nesting platforms, predator control, and nesting habitat improvement projects. Minnesota has an informal common tern working group made up of DNR, USFWS, Indian Reservation, and Park Service. It has been in existence for approximately the past ten years (Mortensen, pers. comm. 2001).

Management plans have been written for common tern. There is a recovery plan for the Common tern in Wisconsin (WIDNR Fact Sheet 2001). Voyageurs National Park in Minnesota has a management plan for the remnant population of common tern at Voyageurs National Park (Mortensen, pers. comm. 2001). The state of Massachusetts has a tern and piping plover Management for Stewardship document (Brad Blodget is the state ornithologist and can be reached at brad.blodget@state.ma.us for a copy). Dr. Francee Cuthbert at the University of Minnesota has written a conservation assessment for the common tern in the Great Lake States, which is presently in draft form. Tern management has been implemented on Cape Cod (Minsky 1981 In NatureServe 2001). Common tern colonies are monitored on a yearly basis on the Lake Erie shoreline and islands (Schieldcastle, pers. comm. 2001).

Researchers from private and public conservation organizations and concerned volunteers, census breeding areas on Long Island annually. Extermination of rats has been undertaken in some areas where they were a problem in the past. In upstate New York, some nesting success has occurred as a result of the construction of gull exclosures on the terns' nesting islands (NYSDEC 1998).

Past and Current Conservation Activities

Gull deterrents have been used. Brightly colored nylon string was effective at preventing ring-billed gulls from occupying their breeding sites at small or new colonies, but not at large, dense colonies having a prior history of successful breeding (Maxson et al 1996). Monofilament was an effective ring-billed gull deterrent at small colony sites although it was slightly less effective than nylon string (Maxson et al 1996). Gull control has benefited common tern in Maine (Buckley and Buckley 1984 In NatureServe 2001).

Control of competitors and predators may be crucial in maintaining common tern populations. However restricting one competitor or predator is usually not adequate to increase fledgling success (Hyde 1997). Reducing human disturbance in addition to intensive programs to control all predators impacting a population may be needed (Cuthbert 1980 In Hyde 1997).

The USGS has used symbolic fencing (signing area as off limits) to deter human disturbance in nesting areas. This method of reducing disturbance is not always effective and enforcement is needed to keep visitors away from nests (Spendelow, pers. comm. 2001).

Habitat manipulation is needed to insure that populations in the Great Lakes ecosystem are maintained at healthy levels (Evers 1994 In Hyde 1997). Artificial nesting sites have been developed to assist common tern, however these created sites often fill up with gulls and cormorants (Mortensen, pers. comm. 2001).

Nesting sites should be managed to provide sparse vegetation (10-30% vegetative cover) and be free of avian and mammalian predators (WIDNR 2000). Prescribed fire in areas succeeding to closed vegetation has been demonstrated to be helpful in maintaining suitable nesting habitat (Scharf 1986 In Hyde 1997). All predators need to be managed, not just one competitor as well as reducing disturbance from humans may be needed (Cuthbert 1980 In Hyde 1997).

At Crane Creek Wildlife Area along Lake Erie in Ohio, artificial nesting platforms are constructed from a pontoon. The common terns can no longer nest successfully in natural nesting areas due to predation (Schieldcastle, pers. comm. 2001). The Ohio Department of Natural Resources goal is five self-sustaining colonies by the year 2010 along Lake Erie (Schieldcastle, per.comm. 2001).

Nesting and foraging habitat is generally not on Forest Service ownership on the Chippewa National Forest and Hiawatha National Forest but there are opportunities, especially for the Chippewa National Forest to assist other landowners and to help manage human intrusion and water quality (Russ, 1999).

RESEARCH AND MONITORING

Existing Surveys, Monitoring and Research

More research is needed to understand the population dynamics of common terns to insure the long-term preservation of nesting colonies (Hyde, 1997, Spendelow, pers. comm. 2001). Specifically research involving habitat availability, relationships with gulls and other competitors, and food requirements are key areas that need further study (Hyde, 1997).

Radio transmitters have been attached to a USFWS leg band without adversely affecting parental behavior (Morris and Burness 1992 In NatureServe 2001). The university of North Dakota has banded many common tern on the eastern seaboard (Mortensen, pers. comm. 2001).

Research has been conducted on parental care of replacement clutches (Behavioral Ecology and Sociobiology, Vol. 47, No. 6:382-392), reproductive nutrient allocation (Auk, Vol. 117, No. 3:760-774), Divorce and asynchronous arrive (Animal Behavior, Vol. 58, No. 5:1123-1129), Effects of motorboats and personal watercraft on flight behavior (Condor, Vol. 100, No. 3:528-534), renesting (Ibis, Vol. 141, No. 3:500-502), variation in brood attendance, prey type delivered to chicks and foraging patterns of male Common terns (Canadian Journal of Zoology, vol. 72, No. 7:1243-1251), reproductive and physiological effects of environmental contaminants (Environmental Monetary Assessment, Vol. 53, No. 1: 117-143), Effects of parental quality on reproductive success (Journal of Animal Ecology, Vol. 68, No. 1:205-214), foraging (Ibis, Vol. 139, No. 2:264), nesting on navigational aids and natural islands (Wilson Bulletin, Vol. 107:423-436).

Survey Protocol

Survey protocol for an intensive survey: at the peak period of nesting (1 week either side of the time hatching of the first chick), a group walks through the colony, each nest is marked with an object then a sweep is conducted through the area walking from the other direction counting all nests that have not been previously marked. A Lincoln/Peterson index can be used to give an estimate of the total nests (Spendelow, pers. comm. 2001). Ground estimates of large colonies (>200) and direct nest counts for smaller colonies are suggested by Erwin and Hoover (undated); using the adult estimate as the estimated breeding pairs although there may be variation by the time of day, season, or colony.

Research Priorities

The common tern needs to be studied on a regional scale and immigration/emigration of colonies needs to be addressed as being part of the population dynamics of this species (Spendelow, pers. comm. 2001). Common terns evolutionary strategy is to stay ahead of the predators and to have adequate food sources. Over time, as changes in food availability and predators locate colonies, colonies move from place to place. This immigration/emmigration is part of population dynamics of the species. This approach to studying population dynamics has not been taken, alternative areas need to be available for the birds to colonize (Spendelow, pers. comm. 2001).

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Information Requests

Review Requests